

**Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal**

Section 1. General administrative information

Transfer Attributes From 1:100,000 To 1:24,000-Scale Hydrography

Bonneville project number, if an ongoing project 9048

Business name of agency, institution or organization requesting funding
Idaho Department of Water Resources

Business acronym (if appropriate) IDWR

Proposal contact person or principal investigator:

Name Anthony Morse
Mailing Address 1301 North Orchard St.
City, ST Zip Boise, ID 83706
Phone (208) 327-7997
Fax (208) 327-7866
Email address tmorse@idwr.state.id.us

Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name
Idaho Department of Fish and Game	600 S. Walnut St.	Boise, ID 83720	Bart Butterfield
Contractor (to be determined)			

NPPC Program Measure Number(s) which this project addresses.

NMFS Biological Opinion Number(s) which this project addresses.

Other planning document references.

Subbasin.

Snake, Salmon, Clearwater, Coeur d'Alene, Selway, Lochsa, Priest, Kootenai, Boise

Short description.

Transfer topology and fishery-related attributes of the established 1:100,000-scale National Hydrography Data Set to the new and incomplete 1:24,000-scale hydrography.

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
+	Anadromous fish		Construction	X	Watershed
X	Resident fish		O & M		Biodiversity/genetics
	Wildlife		Production		Population dynamics
	Oceans/estuaries		Research		Ecosystems
	Climate	X	Monitoring/eval.		Flow/survival
	Other	+	Resource mgmt		Fish disease
		+	Planning/admin.		Supplementation
			Enforcement	+	Wildlife habitat en-
			Acquisitions		hancement/restoration

Other keywords.

Mapping, GIS, Hydrography

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship

Section 4. Objectives, tasks and schedules***Objectives and tasks***

Obj 1,2,3	Objective	Task a,b,c	Task
1	Project Planning	a	draw up work detailed plan
2	Contract for Work	a	draw up Request for Quotes
		b	submit RFQ to State Purchasing
		c	evaluate quotes
		d	award contract

3	Convert Hydrography from DLG-3 to DLG-F	a	IDWR personnel to USGS for DLG training
		b	install conversion software at IDWR
		c	do the conversion
		d	clean up errors and omissions
		e	panel quads to edge-match
4	Conflate 1:100,000-Scale Hydrography to 1:24,000-Scale Hydrography	a	install conflation software on contractor computer
		b	train contractor personnel
		c	edge-match quads
		d	assess flow direction and fix if necessary
		e	conflate
		f	import data into ARC/INFO
		g	sequence new reaches
		h	attach IDFG routes and quality-control
5	Generate Metadata	a	review processing history
6	Put All Data on Anonymous ftp Site	a	add necessary disk space
		b	modify IDWR home page to reflect data availability

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	10/1998	10/1998	3.00%
2	10/1998	12/1998	2.00%
3	11/1998	6/1999	15.00%
4	1/1999	8/2001	75.00%
5	8/2001	8/2001	1.00%
6	8/2001	9/2001	4.00%
			TOTAL 100.00%

Schedule constraints.

Completion date.

FFY 2000

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel		\$37,880
Fringe benefits		\$11,175
Supplies, materials, non-expendable property	plotting supplies	\$1,250
Operations & maintenance	software and hardware maintenance	\$3,750
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	augment state anonymous ftp site; computer replacement	\$7,250
PIT tags	# of tags:	
Travel	training	\$5,000
Indirect costs		\$16,550
Subcontracts	IDFG, and others to be determined through competitive bidding	\$134,000
Other		
TOTAL		\$216,855

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	\$214,355			
O&M as % of total	1.70%			

Section 6. Abstract

The overall goal of this program is to make available an enhanced, network-enabled data set of 1:24,000 hydrography having all capabilities of the 1:100,000-scale National Hydrography Data Set, for use as the basis of hydrologic sampling in the Columbia River tributary watersheds of Idaho. The objective of this project is to integrate features of the existing 1:100,000-scale, National Hydrography Data Set hydrography into 1:24,000 scale hydrography, resulting in a 1:24,000-scale hydrography that has the network capabilities of the 1:100,000 scale hydrography and the ability to access the attributes and data sets currently residing on the 1:100,000 scale hydrography. This project is a logical continuation of the work done on the 1:100,000 data, and funded by BPA. The new hydrography will be basic data to which agencies will tie other data, such as anadromous and native fish populations and habitat, and water quality data supporting EPA 303D and Total Minimum Daily Loading programs. The methods used for integration are presently being developed in a pilot-project among the U.S. Geological survey, IDWR, and IDFG. The outcome of the project funded under this grant will be a

state-wide GIS data set, fully-attributed, and network-enabled, of 1:24,000 hydrography available on the State of Idaho's anonymous ftp site in non-proprietary formats DLG-F and ESRI Shape File, and in ARC/INFO Export format, all organized by USGS Hydrologic Unit. The data will be available on or about July 1, 2000.

Section 7. Project description

a. Technical and/or scientific background.

This project addresses the need for a basic data-set to which a variety of watershed data can be tied and cross-linked in a Geographic Information System (GIS). The National Hydrographic Data Set (NHD) serves this purpose now. However, the NHD does not have all the river reaches that are represented in the 1:24,000-scale hydrography. Currently, the 1:24,000-scale data are only a graphic representation of hydrography, and are without topology, stream direction, and attributed river reach numbers. Both state and federal agencies need a hydrography data set that has all mapped river reaches, and that can support full GIS capabilities. This problem is common to all the Columbia River Basin states. This project is designed to address the problem within Idaho.

The continuity of hydrography from scale-to-scale has been important to users of Idaho hydrography data. The Idaho Departments of Water Resources (IDWR) and Fish and Game (IDFG) began linking attributes to the 1:250,000-scale hydrography developed by the Pacific Northwest Rivers Study. With funding from BPA, IDWR and IDFG cooperated to enhance the 1:100,000-scale hydrography with the EPA river reach numbers, and the agencies structured the new 1:100,000-scale attributes to preserve the 1:250,000-scale origin of those attributes. All key personnel in this project were also key personnel in that effort.

Providing a link between the existing 1:100,000 scale attribute data and the new 1:24,000 scale hydrography will allow users to integrate new data into their data holdings without endangering their existing investments in spatial data and attribute information. In some cases, that investment dates back more than 15 years. In producing a new 1:24,000 scale hydrography layer to complement the existing 1:100,000 scale hydrography layer, we will provide geospatial data at varying resolution for the Columbia River Basin in Idaho and provide a fundamental data-set to which both historical and future data can be linked.

The 1:24,000 scale hydrography produced will be important to local agencies because it will have updated hydrography and access to locally produced data via the link to the data produced for the 1:100,000 scale hydrography. The participants in this project, the Idaho Department of Water Resources (IDWR) and the Idaho Department of Fish and

Game (IDFG) are both major users of state hydrography data. IDFG has an extensive data base, the Idaho Rivers Information System (IRIS), which is linked to the 1:100,000 scale hydrography. IDFG has been developing and maintaining IRIS for over ten years. IRIS data include the absence or presence of anadromous fish, threatened and endangered species locations, and fish census. IDWR, also, has information linked to the 1:100,000 hydrography, including protected river status, recreation information, and minimum streamflow filings. Water-right data are being added as part of IDWR's Snake River Basin Adjudication.

IDFG and IDWR have worked cooperatively on developing hydrography data, with IDWR working on the graphics, and IDFG working on the data-base. For this project, IDWR will work on attributes due to the planned work load over the next year at IDFG. IDFG will do the quality control work.

b. Proposal objectives.

Objective 1) Project Planning

A detailed project plan will be created that specifies specific tasks, responsibilities, timelines, and milestones.

Objective 2) Contract for Work

The volume of work is substantial, and IDWR will need to contract for the bulk of the processing. The product of this objective will be a contract with a GIS firm.

Objective 3) Convert Hydrography from DLG-3 to DLG-F

The 1:24,000-scale hydrography is presently in DLG-3 (Digital Line Graphic-3) format, which does not support the advanced, detailed feature set of the new DLG-F format. Conversion to DLG-F will provide a data model that will support the new feature attributes in a standard, non-proprietary format.

Objective 4) Conflate 1:100,000-Scale Hydrography to 1:24,000-Scale Hydrography

Transfer 1:100,000-scale attributes to 1:24,000-scale line work, and check for conflation errors. The attribute information between the 1:100,000 scale hydrography and 1:24,000 scale hydrography will be checked for inconsistencies, including missing data

and incorrectly coded data. IDFG will transfer their 1:100,000-scale routing to the 1:24,000 hydrography.

Objective 5) Generate Metadata

IDWR will generate FGDC (Federal Geographic Data Committee) compliant metadata for the new hydrography. Although the DLG-F format is well documented by USGS, the additional features and processing history need to be added.

Objective 6) Put All Data on Anonymous ftp Site

Provide easy public access to both data and metadata in a non-proprietary format via the Internet. The products resulting from this work will be 1) 1:24,000-scale hydrography that has the full set of 1:100,000-scale and 1:250,000-scale hydrography attributes, and 2) metadata that complies with the standards promulgated by the Federal Geographic Data Committee. The hydrography data will be available in ESRI Shape File format, ARC/INFO Export format, and DLG-F format on the State of Idaho's anonymous ftp site (<ftp://ftp.state.id.us>), or available upon request on an 8 mm tape. Metadata will be available from the Idaho Metadata server, http://www.inel.gov/gis/eris/idaho_wais.html, which is a Z39.50-compliant, NSDI-registered node.

c. **Rationale and significance to Regional Programs.**

Rationale

Watershed monitoring for fish and wildlife and related environmental applications needs to have a complete and GIS-enabled base to which data are tied. The 1:100,000-scale hydrography data in the National Hydrography Data Set do not represent all the streams that are represented in the 1:24,000-scale hydrography data. The additional streams may be of important fisheries or environmental interest. The 1:100,000-scale data do have valuable attributes that the 1:24,000-scale hydrography does not have. Merging the 1:100,000-scale attributes with the 1:24,000-scale hydrography would yield hydrography having complete representation of streams and rivers, flow direction, river reach numbers, stream names, and other attribute data compiled by other resource agencies such as the Idaho Department of Fish and Game. As attribute data are collected and projects completed, issues related to analysis of project success, cumulative impacts, and distribution of activities all require spatial data. This project will develop the basic framework for the spatial data complement of fish and wildlife activities by the Bonneville Power Administration in Idaho. This same approach could and should be accomplished in the other Columbia River Basin States.

Relevant projects

This work is a logical extension to the considerable effort expended by BPA, USGS, EPA, and the State of Idaho over the last ten, or more, years. Beginning with the Pacific Northwest Rivers Study and continuing to Streamnet, both state and federal agencies have invested heavily in hydrography data. The 1:24,000-scale hydrography data are the largest scale available on a state-wide basis for all the states in the Columbia River Basin.

d. Project history

e. Methods.

Objective 1) Project Planning

Task A: A detailed project plan will be created that specifies specific tasks, responsibilities, timelines, and milestones. The plan will serve as the basis for the project and the request for quotes that will be the means by which a contractor is hired.

Objective 2) Contract for Work

Task A: Draw up a request for quotes (RFQ).

Task B: Submit RFQ to State Purchasing Department for distribution.

Task C: Evaluate quotes.

Task D: Award contract.

The volume of work is great enough that IDWR will need to contract for the bulk of the processing. Any purchase or contract with an Idaho State Agency for \$10,000 or greater must, by law, be executed through the State Division of Purchasing. The work plan will be used as the basis of the RFQ. A contract can be put in place within 45 days of project start. The product of this objective will be a contract with a GIS firm.

Objective 3) Convert Hydrography from DLG-3 to DLG-F

Task A: IDWR personnel to USGS for training.

Task B: Install conversion software at IDWR.

Task C: Do the conversion.

Task D: Clean up omissions and errors.

Task E: Panel quads to edgematch.

The 1:24,000-scale hydrography is presently in DLG-3 (Digital Line Graphic-3) format, which does not support the advanced, detailed feature set of the new DLG-F format. Conversion to DLG-F will provide a data model that will support the new feature attributes in a standard, non-proprietary format. USGS has written conversion software that will be tested on the hydrography of the Boise River. The DLG-F format is new enough that IDWR personnel do not have experience with it. IDWR personnel will need to have a clear and detailed understanding of DLG-F and the conversion software in order to do the conversion. Therefore, IDWR personnel will receive training in the DLG-F format and the conversion software from USGS personnel.

Objective 4) Conflate 1:100,000-Scale Hydrography to 1:24,000-Scale Hydrography

Task A: Install conflation software on contractor computer.

Task B: Train contractor personnel.

Task C: Edgematch paneled quads.

Task D: Assess flow direction and fix if needed.

Task E: Conflate.

Task F: Import conflated data into ARC/INFO.

Task G: Sequence new reaches

Task H: Attach IDFG routes and perform quality-control check.

In order to establish stream topology, the hydrography must be edgematched across the boundaries of 1:24,000-scale quads, and the flow direction must be consistent. Transfer 1:100,000-scale attributes to 1:24,000-scale line work through the process of conflation, and check for errors. The data will be imported into ARC/INFO for processing, and the new reaches present in the 1:24,000-scale data will be assigned segment and stream reach numbers. IDFG will transfer their 1:100,000-scale routing to the 1:24,000 hydrography. The attribute information between the 1:100,000 scale hydrography and 1:24,000 scale hydrography will be checked for inconsistencies, including missing data and incorrectly coded data.

Objective 5) Generate Metadata

Task A: Review processing history.

IDWR will generate FGDC (Federal Geographic Data Committee) compliant metadata for the new hydrography. Although the DLG-F format is well documented by USGS, the additional features and processing history need to be added.

Objective 6) Put All Data on Anonymous ftp Site

Task A: Add necessary disk space.

Task B: Modify IDWR home page to reflect data availability.

Provide easy public access to both data and metadata in a non-proprietary format via the Internet. The products resulting from this work will be 1) 1:24,000-scale hydrography that has the full set of 1:100,000-scale and 1:250,000-scale hydrography attributes, and 2) metadata that complies with the standards promulgated by the Federal Geographic Data Committee. The hydrography data will be available in ESRI Shape File format, ARC/INFO Export format, and DLG-F format on the State of Idaho's anonymous ftp site (<ftp://ftp.state.id.us>), or available upon request on an 8 mm tape. Metadata will be available from the Idaho Metadata Server, http://www.inel.gov/gis/eris/idaho_wais.html, which is a Z39.50-compliant, NSDI-registered node.

f. Facilities and equipment.

The Idaho Department of Water Resources and the Idaho Department of Fish and Game have a history of cooperation in the development of geospatial data. These two agencies cooperated to produce the enhanced 1:100,000 scale hydrography for Idaho. This work was funded by the Bonneville Power Administration. The enhanced 1:100,000 scale hydrography is the source for the National Hydrography Dataset for the Pacific Northwest. This project was summarized in "Enhancing Northwest Hydrography: A Model for State/Federal Cooperation", by Morse and Davis, and presented at the 1994 ESRI International Users' Conference.

Both agencies have extensive experience working cooperatively with Federal agencies. IDWR is working with the U.S. Bureau of Reclamation to map changes in agriculture in the Boise Valley. In the past, IDWR has worked with USGS to collect water use data, and to map land cover; with the US Fish and Wildlife Service on the first state-wide, digital GAP analysis project; with the U.S. Forest Service to map land cover; with the USNRCS, mapping soils; and with the BLM on rangeland analysis. IDFG has a long history of cooperation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service working on fish and wildlife issues. Both agencies have worked with the Bonneville Power Administration on 1:100,000-scale hydrography.

Since the early 1970s, Idaho has had a state mapping advisory committee. This committee was officially recognized by executive order in 1980, and was charged with coordinating mapping programs for state agencies. In 1990, the executive order was reissued, and the state mapping advisory committee was reconfigured as the Idaho Geographic Information Advisory Committee (IGIAC). The scope and responsibilities of IGIAC include both analog and digital geospatial data.

Also in 1980, the Governor established the Idaho Image Analysis Facility (IIAF) within IDWR, and charged it with the leadership role in developing and carrying out remote sensing activities for the state. In 1992, the Governor issued a new executive order combining the authorization of IGIAC, with the restructuring of IIAF into the Idaho Geographic Information Center (IGIC). Under the new executive order IGIC was responsible for both remote sensing and GIS. The order has been reissued as Executive Order 96-24, and continues the IGIC within the organizational structure of the IDWR. The IGIC has the authority to accept and expend funds, and to contract for remote sensing and GIS projects.

The lead for this project will be the Idaho Department of Water Resources. IDWR has had a GIS/remote sensing program continuously for 19 years. Presently, there are 11 full-time and 3 part-time GIS personnel at IDWR. IDWR personnel have worked on hydrography data-sets, first the 1:250,000, then the 1:100,000, and now on a pilot project with USGS and IDFG to conflate the 1:100,000-scale hydrography to the 1:24,000-scale hydrography. IDWR is the lead state agency for GIS; IDWR and IDFG share joint responsibility for the 1:100,000 hydrography data set for Idaho.

Idaho Department of Water Resources facilities:

Hardware

- 2 DECStation 3000/700 workstations, both with 320 MB RAM (DEC UNIX)
- 1 Decstation 5000/260 workstation (ULTRIX)
- 1 HP Vectra 6/200 dual Pentium Pro Server (Windows NT Server)
- HP 650C E-bed plotter
- HP 750C E-bed plotter
- Calcomp Drawingboard III digitizer (40"x48")
- Calcomp 9000 digitizer (40"x48")
- 3 Hitachi digitizers (24"x36")
- 87 GB on-line disk storage
- 16 Pentium-class PCs (Windows NT Workstation)

Software

ESRI

- 12 ARC/INFO workstation licenses
- 4 Grid licenses
- 18 ARCView licenses

TIN

NETWORK

Microsoft

SQL Server

Computer Associates

INGRES

Idaho Department of Fish and Game facilities:

Hardware

1 Sun Ultra 1 Model 140
HP 650C E-bed plotter
Calcomp 9500 Digitizer

Software

3 ARC/INFO workstation licenses
NETWORK

g. References.

The following references are applicable:

Bonneville Power Administration. 1986. U.S. Environmental Protection Agency River Reach File, Hydrologic Segment Plots - Idaho. Pacific Northwest Rivers Study.

Nellis, C., and Allen, S. 1987. Pacific Northwest Rivers Study Assessment Guidelines. Pacific Northwest Rivers Study.

Morse, A. and Davis, L. 1994. Enhancing Northwest Hydrography: A Model for State-Federal Cooperation. Proceedings of the 14th International ARC/INFO Users' Group Conference; Palm Springs, CA

Section 8. Relationships to other projects

IDWR and IDFG are presently working with the US Geological Survey on a pilot project to accomplish in the Lower Boise River watershed what is being proposed here for the entire Columbia River Basin in Idaho. All necessary software and techniques will be developed under the pilot project, and will apply directly and in whole to this work.

Section 9. Key personnel

Key Personnel:

IDWR

Anthony Morse, Manager, Idaho Geographic Information Center/ Manager,
Resource Information Section; .375 FTE (780 hours in FY99 and FY00)

Linda Davis, Senior GIS Analyst, Resource Information Section; .375 FTE (780
hours) in both FY99 and FY00.

Sandra Thiel, GIS Analyst, Resource Information Section; .125 FTE (345 hours)
in both FY99 and FY00.

IDFG

Bart Butterfield, Senior GIS Analyst; .125 FTE (260 hours) in both FY99 and
FY00.

Resumes of relevant personnel:

Anthony Morse

EDUCATION

1984 **Master of Science**, Colorado State University; Remote Sensing

1975 **Bachelor of Science**, University of Massachusetts; Remote Sensing

EXPERIENCE

1988 - present **Manager, Idaho Geographic Information Center**

Manager, Resource Information Section

Idaho Department of Water Resources, Boise, ID 83706

1983 - 1988 **Senior Remote Sensing Analyst** Idaho Department of Water Resources,
Boise, ID 83720

1980 - 1983 **Lead Applications Scientist** TGS Technology, NASA/Ames Research
Center, Moffett Field, CA

1978 - 1980 **Research Assistant** Department of Earth Resources, Colorado State
University

1978 **Research Engineer** Environmental Research Institute of Michigan,
Ann Arbor, MI

1976 - 1978 **Image Analyst** Bendix Aerospace Systems Division, Ann Arbor, MI

1968 - 1972 **Aerial Photograph Interpreter** United States Air Force

CURRENT RESPONSIBILITIES

Manages activities of professional and technical staff in GIS, remote
sensing, cartography, and data-base development at the lead state
agency for natural resource information systems in Idaho; establishes goals
and priorities; prepares and monitors budgets; identifies problems and

develops solutions; hires, trains, and evaluates staff; manages interstate and intrastate projects; manages federal cooperative projects

RECENT PUBLICATIONS

Kramber, W.J., A. Morse, B. Harmon, and H. Anderson; 1997; Mapping Eighty Years of Change in Irrigated Agriculture; Proceedings of the Annual Convention; ASPRS, Seattle, WA.

Morse, A. and L. Davis; 1994; Enhancing Northwest Hydrography: A Model for State-Federal Cooperation; presented at the 14th International ARC/INFO Users' Group Conference; Palm Springs, CA

Kramber, W.J. and A. Morse; 1994; Combining Digital Classification with Image Interpretation; Proceedings of the 1994 Annual Meeting, ASPRS/ACSM; Reno, NV

Morse, A.; 1992; Estimating Agricultural Evapotranspiration with GIS; Proceedings of the 17th Congress of the International Society for Photogrammetry and Remote Sensing; Washington, DC

Morse, A., D.S. Palmer, and D.L. Greigor, 1992; Estimating Future Agricultural Evapotranspiration by Linking Predictions from General Circulation Models with Estimates of Present Evapotranspiration; Proceedings of the 28th Annual Symposium; American Water Resources Association; Reno, NV

Linda Davis

EDUCATION

1983 **Bachelor of Arts**, University of California, Santa Barbara, Geological Sciences

1989 **MS program**, San Diego State University, Department of Geography

EXPERIENCE

1997 - present
Resource

Senior Geographic Information System Analyst,

Information Section

Idaho Department of Water Resources, Boise ID 83706

1989-1997
Bureau

Geographic Information System Analyst, Planning

Idaho Department of Water Resources, Boise ID 83706

CURRENT RESPONSIBILITIES

Plans and conducts complex geographic information system analyses for natural resource inventories. Plans GIS project design and designs spatial and relational databases. Trains new users in computer system use, photo map and digital data analysis equipment utilization and GIS processing. Applies complex combinations and sequences of specialized computer programs to process spatial data. Supervises digitizing staff.

GIS Projects

Worked with other Northwest States and agencies to produce an enhanced 1:100,000 scale hydrography. This hydrography has flow direction and centerlines and has additional attributes including reach number, stream name, and quad name. This hydrography is used as a foundation for many databases and is used as a base for the national hydrography data set.

In conjunction with other State agencies, private companies and federal agencies, developed a fifth-field watershed coverage for the state of Idaho. The criteria for developing the watersheds was developed by the group. Watersheds were drafted on 1:250,000 Scale hydrography plots and then digitized into a statewide coverage. Information about this coverage has been made available through the State of Idaho Web site and the ARC/INFO coverage is available on the State of Idaho ftp site. The purpose of this project was to develop a common, useful statewide watershed GIS coverage.

Currently working on a Framework Demonstration pilot through an FDGC grant to integrate 1:24,000 scale hydrography DLG-F data with the 1:100,000 National Hydrography Data Set. The pilot project area is located in the Boise Valley and consists of 45 quads of 1:24,000 scale hydrography. The purpose of this pilot project is to develop a methodology for integrating higher resolution hydrography with the current hydrography data sets.

Morse, A. and L. Davis; 1994; Enhancing Northwest Hydrography: A Model for State-Federal Cooperation; presented at the 14th International ARC/INFO Users' Group Conference; Palm Springs, CA

Sandra Thiel

EDUCATION

1989 **Master of Science** University of Idaho, Geography

1986 **Bachelor of Science** University of Idaho, Cartography, Psychology

EXPERIENCE

1990 - Present **GIS Analyst** Idaho Department of Water Resources, Boise, ID

1989 - 1990 **Mapping Support** Idaho Department of Fish and Game; Boise, ID

1987 - 1989 **Geography Research Assistant** University of Idaho, Moscow, ID

1988 **Environmental Programs Support Staff** EG&G Idaho, Idaho Falls, ID

CURRENT RESPONSIBILITIES

Provides GIS support for planning, ground water monitoring, and resource information. This includes creating maps from existing digital databases and generating new digital spatial data when required. Responsible for updating and maintaining the surface water digital database for the state of Idaho and creating a numbering system using the 1:100,000-scale hydrography for the Clean Water Act 303(d) water quality limited streams, and mapping the results. Idaho representative for the National States Geographic Information Council Framework Data Survey. Current work includes developing fifth-field watershed coverage for the state of Idaho; Framework Demonstration pilot through an FDGC grant to integrate 1:24,000 scale hydrography DLG-F data with the 1:100,000 National Hydrography Data Set. The pilot project area is located in the Boise Valley and consists of 45 quads of 1:24,000 scale hydrography. The purpose of this pilot project is to develop a methodology for integrating higher resolution hydrography with the current hydrography data sets.

Bart Butterfield

EDUCATION

1985 **Master of Science**, University of Idaho, Wildlife Resources

1980 **Bachelor of Arts**, Western State College of Colorado, Biology

EXPERIENCE

1992-Present **Senior Geographic Information Systems Analyst**, Idaho
Department of
Fish and Game, Boise, ID

1989-1992 **Research Associate, Graduate Research Assistant** University of
Idaho,
Moscow, ID

1986-1992 Sole Proprietor, Mountain West Ecology, Moscow, ID 83843

CURRENT RESPONSIBILITIES

Responsible for GIS activities in the State of Idaho Department of Fish and Game. Conduct GIS analyses and cartography while developing department-wide GIS database.

RECENT PUBLICATIONS

Groves, C. R., B. Butterfield, A. Lippincott, B. Csuti and J. M. Scott. 1997. Atlas of Idaho's Wildlife: Integrating Gap Analysis and Natural Heritage Information. A. Lippincott, editor. Idaho Department of Fish and Game, Nongame and Endangered Wildlife Program, Boise. 372 pp.

Keister, A. R., J. M. Scott, B. Csuti, R. F. Noss, B. Butterfield, K. Sahr, and D. White. 1996. Conservation prioritization using GAP data. *Conservation Biology* 10:1332-1342.

Caicco, S. L., J. M. Scott, B. Butterfield, and B. Csuti. 1995. A gap analysis of the management status of the vegetation of Idaho (U.S.A.). *Conservation Biology* 9:498-511.

Butterfield, B. R., B. Csuti, and J. M. Scott. 1994. Modeling vertebrate distributions for Gap Analysis. Pp. 53-68 in R. I. Miller, editor. *Mapping the Diversity of Nature*. Chapman & Hall, London.

Scott, J. M., F. Davis, B. Csuti, R. Noss, B. Butterfield, C. Groves, H. Anderson, S. Caicco, F. D'Erchia, T. C. Edwards, Jr., J. Ulliman, and R. G. Wright. 1993. Gap analysis: a geographic approach to protection of biological diversity. *Wildlife Monographs* No. 123: 1-41.

Section 10. Information/technology transfer

This project will develop both the 1:24,000-scale hydrography data and associated metadata. Both data-sets will comply with standards promulgated by the Federal Geographic Data Committee, and be publicly accessible. Unrestricted public access to the data will be mainly through Idaho's anonymous ftp site (<ftp://ftp.state.id.us>). The data will also be available, upon request, via 8 mm tape. The coverages will be available as ARC/INFO export files, and in the non-proprietary DLG-F and ESRI Shape File formats. IDWR presently has available approximately 2 GB of GIS data on the state anonymous ftp site